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Simulation of serotonin mechanisms in NEUCOGAR cognitive architecture

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Abstract

© 2018 The Authors. This work aims at demonstrating that the neuromodulatory mechanisms that control the emo-tional states of mammals (specifically rat's brains) can be represented and re-implemented in a computational model processed by a machine. In particular we specifically focus on two neuro-transmitters, serotonin and dopamine, starting from their fundamental role in basic cognitive processes. In our specific implementation, we represent the simulation of the 'disgust-like' state based on the three dimensional neuromodulatory model of affects or emotions, according to the 'cube of emotions'. These functional mechanisms can be transferred into an artificial system: Inhibition, for example, can elicit a blocking behaviour that, depending on its intensity and duration, can push the system to a general emotional state. We have simulated 1000 mil-liseconds of the serotonin and dopamine systems using NEST Neural Simulation Tool with the rat brain as the model to artificially reproduce this mechanism on a computational system.

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Keywords

Affective computing, Artificial intelligence, Disgust, Dopamine, Emo-tion modelling, Neuromodulation, Serotonin, Simulation

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